

**AMENDMENTS TO THE CLAIMS**

1-12 (Cancelled)

13. (Currently Amended) A proton-conducting electrolyte membrane obtained by a method comprising the steps:

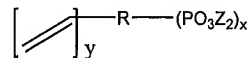
- a) expanding a polymer film with a liquid that contains a vinyl-containing phosphonic acid, and
- b) polymerizing the vinyl-containing phosphonic acid present in the liquid of step a), wherein
  - the product obtained in step (a) includes at least 50% by weight of vinyl-containing phosphonic acid; and
  - the intrinsic conductivity of the inventive membrane at temperatures of 160°C is at least 0.001 S/cm wherein this value is achieved without humidification and

wherein the polyvinyl containing phosphonic acid formed in step b) forms an inter-penetrating network with the polymer of the polymer film from step a).

14. (Cancelled)

15. (Previously presented) The membrane of Claim 13, characterized in that the polymers used in step a) are high-temperature stable polymers which contain at least one nitrogen, oxygen, or sulphur atom in one or more recurring units.

16. (Previously presented) The membrane of Claim 13, characterized in that the liquid containing the vinyl-containing phosphonic acid contains compounds of the formula

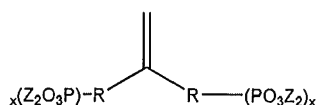


in which

R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>

- Z independently of each other denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub> and
- x denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10
- y denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10

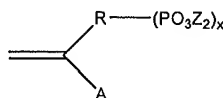
or the formula



in which

- R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>,
- Z independently of each other denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>, and
- x denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10,

or the formula



in which

- A represents a group of formula COOR<sup>2</sup>, CN, CONR<sup>2</sup><sub>2</sub>, OR<sup>2</sup>, or R<sup>2</sup>, in which R<sup>2</sup> denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, or C5-C20 aryl or heteroaryl group, and the abovementioned

radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>,  
R denotes a bond, a bivalent C1-C15 alkylene group, bivalent C1-C15 alkyleneoxy group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>,  
Z independently of each other denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, or C5-C20-aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>, and  
x denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.

17. (Cancelled)
18. (Previously presented) The membrane of Claim 13, characterized in that the liquid containing the vinyl-containing phosphonic acid contains at least one substance that is capable of radical formation.
19. (Previously presented) The membrane of Claim 13, characterized in that the polymerization of step c) takes place by irradiation with IR light, NIR light, UV light,  $\beta$ -radiation,  $\gamma$ -radiation, or electron radiation.
20. (Previously presented) The membrane of Claim 13, characterized in that the membrane has an intrinsic conductivity of at least 20 mS/cm and without humidification.
21. (Previously Presented) The membrane of Claim 13, characterized in that the membrane contains between 0.5% and 95% by weight of polymer and between 10% and 99.5% by weight polyvinyl-containing phosphonic acid.
22. (Previously presented) The membrane of Claim 13, characterized in that the membrane has a layer containing a catalytically active component.

23-33. (Cancelled)

34. (Currently Amended) A proton-conducting electrolyte membrane obtained by a method comprising the steps:

- a) expanding a polymer film with a liquid that contains a vinyl-containing phosphonic acid, and
- b) polymerizing the vinyl-containing phosphonic acid present in the liquid of step a),

wherein the product obtained in step (a) includes at least 70% by weight of vinyl-containing phosphonic acid; and

the intrinsic conductivity of the inventive membrane at temperatures of 160°C is at least 0.001 S/cm wherein this value is achieved without humidification and

wherein the polyvinyl containing phosphonic acid formed in step b) forms an inter-penetrating network with the polymer of the polymer film from step a).

35. (Withdrawn) A process to produce a proton-conducting electrolyte membrane comprising the steps:

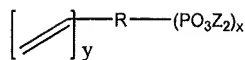
- a) expanding a polymer film with a liquid that contains a vinyl-containing phosphonic acid, and
- b) polymerizing the vinyl-containing phosphonic acid present in the liquid of step a), wherein

the product obtained in step (a) includes at least 50% by weight of vinyl-containing phosphonic acid; and

the intrinsic conductivity of the inventive membrane at temperatures of 160°C is at least 0.001 S/cm.

36. (Withdrawn) The process of Claim 35, wherein the polymers used in step a) are high-temperature stable polymers which contain at least one nitrogen, oxygen, or sulphur atom in one or more recurring units.

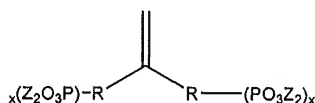
37. (Withdrawn) The process of Claim 35, wherein the liquid containing the vinyl-containing phosphonic acid contains compounds of the formula



in which

- R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>
- Z independently of each other denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub> and
- x denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10
- y denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10

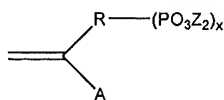
or the formula



in which

- R denotes a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>,
- Z independently of each other denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen, -OH, COOZ, -CN, NZ<sub>2</sub>, and
- x denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10,

or the formula



in which

- A represents a group of formula  $\text{COOR}^2$ ,  $\text{CN}$ ,  $\text{CONR}_2^2$ ,  $\text{OR}^2$ , or  $\text{R}^2$ , in which  $\text{R}^2$  denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, or C5-C20 aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen,  $-\text{OH}$ ,  $\text{COOZ}$ ,  $-\text{CN}$ ,  $\text{NZ}_2$ ,
- R denotes a bond, a bivalent C1-C15 alkylene group, bivalent C1-C15 alkyleneoxy group, and the abovementioned radicals are optionally substituted by halogen,  $-\text{OH}$ ,  $\text{COOZ}$ ,  $-\text{CN}$ ,  $\text{NZ}_2$ ,
- Z independently of each other denotes hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group, or C5-C20-aryl or heteroaryl group, and the abovementioned radicals are optionally substituted by halogen,  $-\text{OH}$ ,  $\text{COOZ}$ ,  $-\text{CN}$ ,  $\text{NZ}_2$ , and
- x denotes a whole number 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.

38. (Withdrawn) The process of Claim 35, wherein the liquid containing the vinyl-containing phosphonic acid contains at least one substance that is capable of radical formation.
39. (Withdrawn) The process of Claim 35, wherein the polymerization of step c) takes place by irradiation with IR light, NIR light, UV light,  $\beta$ -radiation,  $\gamma$ -radiation, or electron radiation.
40. (Withdrawn) The process of Claim 35, wherein the membrane has an intrinsic conductivity of at least 20 mS/cm and the process is carried out without humidification.
41. (Withdrawn) The process of Claim 35, wherein the membrane contains between 0.5% and 95% by weight of polymer and between 10% and 99.5% by weight polyvinyl-containing phosphonic acid.

42. (Withdrawn) The process of Claim 35, wherein the membrane has a layer containing a catalytically active component.
43. (Withdrawn) The process of Claim 35, wherein the product obtained in step (a) includes at least 70% by weight of vinyl-containing phosphonic acid.
44. (Withdrawn) The process of Claim 35, wherein the process is carried out without humidification.